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Rclosable seals and docking systems containing these seals

Claims

- 1. A reclosable zip seal for reversible closing of a coupling seal, comprising a coupling seal for substantially environmentally impermeable reversible sealing as well as for substantially environmentally impermeable filling and/or decanting of bulk material from containers or tube elements, comprising at least one first flexible sealing strip (2), comprising an inner side (6) and a top side (14), with at least one first sealing element (10) on its inner side (6) and at least one second flexible sealing strip (4), comprising an inner side (8) and a top side (16), with at least one second sealing element (12) on its inner side (8), which is complementary to the first sealing element (10), so that first and second sealing elements can be meshed and reversible, tight sealing of the coupling seal can be enabled, whereby first and the second sealing strip (2, 4) are connected to one another, and whereby the top side (14) of the first sealing strip (2) has at least one third sealing element (18) for reversible docking on a complementary sealing element and the top side (16) of the second sealing strip (4) has at least one fourth sealing element (20) for reversible docking on a complementary sealing element; and at least one zip slide for opening and closing of the coupling seal, which can be moved along the coupling seal, with a separated and a compression end and opposite side walls as well as a separating element at the separating end, which can be slid between the first and second sealing element (10, 12) of the first and second sealing strips (2, 4), whereby the first and the second sealing element (10, 12) can be meshed in reaction to the movement of the zip slide in a sealing direction from the open position into the

closed position to one another and can be brought into an open position in reaction to the movement of the zip slide in a direction of opening from the closed position.

2. A reclosable docking seal for reversible docking of two coupling seals for substantially environmentally impermeable reversible sealing of and for substantially environmentally impermeable filling and/or decanting of bulk material from containers or tube elements, comprising
a coupling seal, comprising
at least one first flexible sealing strip (2), comprising an inner side (6) and a top side (14), with at least one first sealing element (10) on its inner side (6) and
at least one second flexible sealing strip (4), comprising an inner side (8) and a top side (16), with at least one second sealing element (12) on its inner side (8),
which is complementary to the first sealing element (10), so that first and second sealing elements can be meshed and reversible, tight sealing of the coupling seal is enabled,
whereby the first and the second sealing strip (2, 4) are connected to one another, and
whereby the top side (14) of the first sealing strip (2) has at least one third sealing element (18) for reversible docking on a complementary sealing element and the top side (16) of the second sealing strip (4) has at least a fourth sealing element (20) for reversible docking on a complementary sealing element; and
at least one coupling slide element, which encroaches on the first and second sealing strip (2, 4) in sections and which can be moved along the coupling seal (1), suitable for coupling and uncoupling the sealing strips (2, 4) of the coupling seal (1) with the sealing strips of another coupling seal, containing sealing elements, which are complementary to the third and fourth sealing elements (18, 20) of the sealing strips (2, 4) of the coupling seal (1) of the docking seal in each case.
3. A docking seal as claimed in Claim 2, characterised in that
the coupling slide element comprises a sealing wall as well as opposite first and second side walls, extending downwards from opposite sides of the sealing wall and which receive the first and second sealing strips (2, 4) between them,
a first wall section, lying opposite the sealing wall and moving away from the first side wall in the direction of the opposite second side wall and encroaches on at least one section of the underside of the first flexible sealing strip (2) at least in sections,

a second wall section, lying opposite the sealing wall and moving away from the second side wall in the direction of the opposite first side wall and encroaches on at least one section of the underside of the second flexible sealing strip (4) at least in sections, whereby at least one gap remains between the first and second wall section, at least one guide channel for the first and second sealing strip (2, 4), formed with the opposite side walls, the sealing wall and the first and second sections of walls, and a front wall surface with an inlet opening of the channel and a rear wall surface with a discharge opening of the channel, whereby the inlet and the discharge opening as well as the channel between inlet and discharge opening are suitable for receiving the first and second sealing strip (2, 4), whereby that edge of the inlet opening, adjacent to the top sides (14, 16) of first and second sealing strip (2, 4), is remote from the outer surface of the sealing wall and whereby the inner surface of the sealing wall, a constituent of the channel, approaches of the outer surface of the sealing wall at least in sections from the inlet opening in the direction of the discharge opening and at the latest merges into the latter at the discharge opening, so that the sealing wall or areas of the sealing wall are no longer present at least over the width of the top sides (14, 16) of the first and second sealing strips (2, 4), and whereby the height of the channel corresponds approximately to the height of the flexible first and/or second sealing elements (2, 4) at least at the point where the sealing wall assumes zero thickness.

4. The seal as claimed in Claim 2 or 3, further comprising at least one zip slide for opening and closing of the coupling seal, which can be moved along the coupling seal, with a separated and a compression end and opposite side walls as well as a separating element at the separating end, which can be slid in between the first and second sealing elements (10, 12), whereby in reaction to the movement of the zip slide the first and the second sealing element (10, 12) can be meshed together in a sealing direction from the open position into the closed position and in reaction to the movement of the zip slide in a direction of opening can be brought out of the closed position into an open position.

5. The seal as claimed in Claim 4, characterised in that the coupling slide element and the zip slide can be connected to one another, in particular reversibly, or in that the coupling slide element and the zip slide are integrated into a single slide.
6. The seal as claimed in any one of the preceding claims, characterised in that the zip slide, which can be moved between a closed position and an open position along the first and second sealing strips (2, 4), comprises an upper sealing wall as well as opposite side walls, extending downwards from opposite sides of the sealing wall and which take up the first and second sealing strip (2, 4) between them, whereby the side walls run from the separating end to the compression end of the zip slide and at the separating end are again as far apart as at the compression end, whereby at the compression end the side walls are spaced apart sufficiently closely that, when the zip slide is moved to the closed position, they press the first and second sealing element (2, 4) into mutual meshing, and whereby at the separating end the separating element protrudes from the sealing wall between the side walls and on the first and second sealing element (10, 12).
7. The seal as claimed in any one of the preceding claims, characterised by a flexible bag or tube, whereof the opening edge is connected sealed to the first and second sealing strip (2, 4), separately or monobloc.
8. The seal as claimed in any one of the preceding claims, characterised in that at least the inner side (6, 8) and/or the top side (14, 16) of the first and/or second sealing strip (2, 4) of the coupling seal at least in sections has or respectively have an adhesive layer.
9. The seal as claimed in any one of the preceding claims, characterised in that the first and/or second sealing strip, in particular on the outside, has or respectively have at least one operating grip.
10. The seal as claimed in any one of the preceding claims, characterised in that the first and second sealing strip (2, 4) and/or the first and second sealing element (10, 12) are substantially the same length.

11. A docking system for filling and/or decanting bulk material, comprising a first seal as claimed in any one of the preceding claims and a second seal as claimed in any one of the preceding claims, whereby the third and fourth sealing elements (18, 20) of the top sides (14, 16) of first and second sealing strip (2, 4) of the first coupling seal are complementary to the third and fourth sealing elements (20', 18') of the top sides (14', 16') of first and second sealing strip (2', 4') of the second coupling seal, so that the first and second sealing strips (2, 2', 4, 4') of first and second coupling seal can be connected reversibly to one another, and whereby the zip slide of first and second seals and/or the coupling slide elements of first and second seals can be superposed and/or can be coupled to one another.
12. The docking system as claimed in Claim 11, characterised in that the zip slide of first and second seals and/or the coupling slide elements of first and second seals can be coupled reversibly to one another via corresponding means, in particular in, at or on their sealing walls.
13. The docking system as claimed in Claim 11 or 12, characterised in that the first and second seal comprise zip seals as claimed in Claim 1 or 2.
14. The docking system as claimed in Claim 11 or 12, characterised in that the first and second seal comprise docking seals as claimed in Claim 3.
15. The docking system as claimed in Claim 11 or 12, characterised in that the first and second seal seals as claimed in Claim 4 or that the first seal comprises a seal as claimed in Claim 4 and the second seal comprises a seal as claimed in Claim 3.
16. The docking system as claimed in Claim 11 or 12, characterised in that the first and second seal seals as claimed in Claim 5, in that the first seal has a seal as claimed in Claim 5 and the second seal has a seal as claimed in Claim 4, or in that the first seal has a seal as claimed in Claim 5 and the second seal has a seal as claimed in Claim 3.

17. The docking system as claimed in any one of Claims 11 to 16, characterised in that the first and second coupling seals of first and second seal, the zip slide of first and second seal and/or the coupling slide elements of first and second seal are formed substantially identical and/or mirror-image.
18. A multiple coupling seal for substantially environmentally impermeable, reversible sealing and for substantially environmentally impermeable filling and/or decanting of bulk material from flexible and/or rigid containers or conveying means, comprising at least two first and second seals connected or which can be connected to one another at least in sections in each case via flexible first conveying means, in each case comprising coupling seals, which can be coupled to coupling seals of corresponding first and second seals,
whereby the opening face, in particular the inner diameter, of the opened coupling seal of the first seal is bigger than the outer circumference and/or opening face, in particular the outer and/or inner diameter, of the coupling seal of the second seal,
whereby when the coupling seal of the first seal is opened the second seal can be docked with a corresponding seal inside the conveying means and/or when the first seal penetrates through the opening of the coupling seal at least in sections by forming a docking mechanism, whereby at least the first seal constitutes a seal as claimed in any one of Claims 1 to 10.
19. The multiple coupling seal as claimed in Claim 18, characterised in that the second seal, in particular environmentally impermeable, can be connected or is connected to flexible second conveying means at least in sections.
20. The multiple coupling seal as claimed in Claim 18 or 19, characterised in that the coupling seal of the second seal comprises a closure flap with a first connecting piece, whereby the closure flap can be brought into a closed position, in which the first end of the connecting piece can be sealed off tightly from the atmosphere.
21. The multiple coupling seal as claimed in Claim 18 to 20, characterised by at least one particularly reversible and/or environmentally impermeable connecting device, in particular a Triclamp connection, at least one coupling seal or a basic element or container connected to a coupling seal, to which the first or second conveying

means directly or indirectly, in particular environmentally impermeable, can be connected or is connected to a coupling seal or the basic element or container connected to this coupling seal.

22. A multiple docking device, in particular a double docking mechanism, for filling and/or decanting bulk material, comprising a first and a second multiple coupling seal as claimed in any one of Claims 18 to 21, whereby the adjacent first seals of first and second multiple coupling seal are coupled or can be coupled to one another by forming a first docking system as claimed in any one of Claims 11 to 17, in particular environmentally impermeable, and whereby the second seals of first and second multiple coupling seal are coupled or can be coupled to one another by forming a second docking system, in particular environmentally impermeable.
23. A container, in particular a flexible container, comprising at least one seal as claimed in any one of Claims 1 to 10, in particular as claimed in any one of Claims 4 to 10.
24. Conveying means, in particular a tube, comprising at least one seal as claimed in any one of Claims 1 to 10, in particular as claimed in any one of Claims 4 to 10.
25. A container, in particular a flexible container, comprising at least one multiple coupling seal as claimed in any one of Claims 18 to 21, whereby the coupling seal of the second seal can be connected or is connected to the container indirectly or via the second flexible conveying means, in particular a tube element, or is an integral constituent of the container.
26. Conveying means, in particular a tube, comprising at least one multiple coupling seal as claimed in any one of Claims 18 to 21, whereby the coupling seal of the second seal can be connected or is connected to the container indirectly or via the second flexible conveying means, in particular a tube element, or is an integral constituent of the container.
27. A method for particularly environmentally impermeable filling, decanting and/or emptying of containers and/or with conveying means, comprising the steps of:

- providing at least in the opening area flexible first container or conveying means, in particular as claimed in Claim 23 or respectively 24, containing at least one first, preferably sealed present, seal as claimed in any one of Claims 4 to 10,
- providing at least in the opening area flexible second container or conveying means, in particular as claimed in Claim 23 or respectively 24, containing at least one second, preferably sealed present, seal as claimed in any one of Claims 4 to 10,
- coupling the slide, in each case comprising coupling slide elements, of first and second seal, so that the first and second sealing strips of the coupling seals of first and second seal can be brought to bear on one another,
- joint moving of the coupled slide or coupling slide elements of first and second seal along at least in each case a section of first and second sealing strip of the coupling seals of first and second seal by forming a docking system as claimed in any one of Claims 11 to 17,
- joint or time-offset moving of the zip slide of first and second seal in a direction of opening out of the closed position into an open position by forming an environmentally impermeable continuous opening between first container or conveying means and second container or conveying means,
- transferring bulk material from the first container or conveying means to the second container or conveying means, or vice versa,
- joint or time-offset moving of the zip slide of first and second seal in a sealing direction from the open position to a closed position by forming environmentally impermeable first and second seals and while retaining an environmentally impermeable docking system,
- joint moving of the coupled slide or coupling slide elements of first and second seal along at least in each case a section of first and second sealing strip of the coupling seals of first and second seal while separating docking system as claimed in any one of Claims 11 to 17, in particular while retaining environmentally impermeable first and second seals.

28. The method as claimed in Claim 27, characterised in that the coupling slide elements and the zip slide of first and second seal are moved at the same time by forming and/or separating the docking system as claimed in any one of

Claims 11 to 17, whereby the coupling slide element and the zip slide of the first seal and/or the coupling slide element and the zip slide of the second seal are preferably adjacent indirectly or directly and/or whereby the zip slide of first and second seal are superposed.

29. The method as claimed in Claim 27 or 28, characterised in that the coupling slide element and the zip slide of the first seal and/or the coupling slide element and the zip slide of the second seal are integrated into a single slide.
30. The method as claimed in any one of Claims 27 to 29, characterised in that the lengths of first and second sealing strip of the first seal and the lengths of first and second sealing strip of the second seal substantially match.
31. A method for particularly environmentally impermeable filling, decanting and/or emptying of containers and/or with conveying means, comprising the steps of:
 - providing at least in the opening area flexible first container or conveying means, in particular as claimed in Claim 25 or respectively 26, containing at least one first multiple coupling seal as claimed in any one of Claims 18 to 21, whereby the first and/or second seal of the first multiple coupling seal preferably is or respectively are sealed,
 - providing at least in the opening area flexible second container or conveying means, in particular as claimed in Claim 25 or respectively 26, containing at least one second multiple coupling seal as claimed in any one of Claims 18 to 21, whereby the first and/or second seal of the second multiple coupling seal preferably is or respectively are sealed,
 - coupling of the first seals of first and second multiple coupling seal by forming a docking system as claimed in any one of Claims 11 to 17 by coupling the slides, in each case comprising coupling slide elements, of the first seals of first and second multiple coupling seal, so that the first and second sealing strips of the coupling seals of the first seals of first and second multiple coupling seal can be brought to bear on one another, and joint moving of the coupled slide or coupling slide elements of the first seals of first and second multiple coupling seal along at least in each case a section of first and second sealing strip of the coupling seals of the first seals of first and second multiple coupling seal,

- opening of the coupled first seals of first and second multiple coupling seal while retaining an environmentally impermeable docking system by joint or time-offset moving of the zip slide of the first seals of first and second multiple coupling seal in a direction of opening out of the closed position into an open position by forming an environmentally impermeable continuous opening between first container or conveying means and second container or conveying means,
- coupling of the second seals of first and second multiple coupling seal by forming a particularly environmentally impermeable second docking mechanism, in particular by forming a multiple docking device as claimed in Claim 22,
- simultaneous or successive opening of the second seals of first and second multiple coupling seal at least in sections, while retaining the environmentally impermeable second docking mechanism,
- transferring bulk material from the first container or conveying means into the second container or conveying means, or vice versa,
- simultaneous or successive sealing of the second seals of first and second multiple coupling seal while retaining an environmentally impermeable second docking mechanism,
- uncoupling of the second seals of first and second multiple coupling seal while separating the second docking mechanism,
- simultaneous or time-offset sealing of the first seal of the first multiple coupling seal and/or of the first seal of the second multiple coupling seal by joint or time-offset moving of the zip slide of the first seals of first and second multiple coupling seal in a sealing direction from the open position to a closed position by forming environmentally impermeable first seals of first and second multiple coupling seal and while retaining an environmentally impermeable docking system, and
- uncoupling of the first seals of first and second multiple coupling seal by joint moving of the coupled slide or coupling slide elements of first and second seal along at least in each case a section of first and second sealing strip of the coupling seals of first and second multiple coupling seal while separating the docking system as claimed in any one of Claims 11 to 17.

32. The method as claimed in Claim 31, characterised in that the coupling slide elements and the zip slide of the first seals of first and second multiple coupling seal are moved at the same time forming and/or separating of the docking system as claimed in any one of Claims 11 to 17, whereby the coupling slide element and the zip slide of the seal of the first multiple coupling seal and/or the coupling slide element and the zip slide of the seal of the second multiple coupling seal are preferably indirectly or directly adjacent.
33. The method as claimed in Claim 31 or 32, characterised in that the coupling slide element and the zip slide of the seal of the first multiple coupling seal and/or the coupling slide element and the zip slide of the seal of the second multiple coupling seal are integrated into a single slide.

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Legend

1, 1'	coupling seal
2, 2'	first sealing strip
4, 4'	second sealing strip
6	inner side of the first sealing strip
8	inner side of the second sealing strip
10, 10'	first sealing element
12, 12'	second sealing element
14, 14'	top side of the first sealing strip
16, 16'	top side of the second sealing strip
18, 18'	third sealing element
20, 20'	fourth sealing element
50	first flexible container
52	second flexible container
100	first combined slide
102	second combined slide
104	first end stop
106	second end stop
108	sealing wall
110	sealing wall
112	docking system
114	through opening
150	inlet opening of the first combined seal 100
152	inlet opening of the second combined seal 102
154	first side wall of the first combined seal 100
156	second side wall of the first combined seal 100
158	first side wall of the second combined seal 102
160	second side wall of the second combined seal 102
162	wall section going away from the side wall 154
164	wall section going away from the side wall 156
166	wall section going away from the side wall 158
168	wall section going away from the side wall 160
170	edge of the sealing wall 108 adjacent to the inlet opening 150
172	edge of the sealing wall 110 adjacent to the inlet opening 152
174	separating element
176	compression end
178	channel in first combined slide 100
180	channel in second combined slide 102
200	first combined seal
202	second combined seal